AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1.– 23. (Canceled)

24. (Currently Amended) A liquid-filled lens driver for receiving a lens driver control signal from an image signal processor and driving a liquid-filled lens, comprising:

an input/output interface unit exchanging the lens driver control signal and status information of the liquid-filled lens with the image signal processor according to a certain signal transmission protocol;

a system clock generation unit for generating a system clock;

a high voltage generation unit for generating high voltage, which can drive the liquid-filled lens, using low voltage of a battery of a mobile information terminal;

a voltage generation unit for providing reference voltage and bias voltage for operating the liquid-filled lens driver;

a drive signal generation unit for generating a final drive signal for the liquid-filled lens by generating a low level differential waveform ~~an output waveform~~ for driving the liquid-filled lens and amplifying ~~boosting~~ the low level differential waveform ~~output waveform~~ to a high voltage level generated by the high voltage generation unit; and

a control unit for controlling the function units so that they can drive the liquid-filled lens.

25. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the liquid-filled lens driver is provided to each of liquid-filled lens, and is provided with a unique Identification (ID) configured to allow the image signal processor to select the liquid filled lens.

26. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the exchanging of the lens driver control signal and the status information of the liquid-filled lens by the input/output interface unit is performed by a 2-wire serial communication method using:

a clock signal wire for exchanging a control clock signal that controls the exchanging of image information; and

a data signal wire for exchanging data related to the image information and determining power status of the liquid filled lens driver.

27. (Previously Presented) The liquid-filled lens driver according to claim 26, wherein the determination of the power status of the liquid-filled lens driver is performed in such a way as to stop operation of the liquid-filled lens driver by disabling all reference voltage and bias voltage of the liquid-filled lens driver and turning off the system clock generation unit when a power-off mode signal is received.

28. (Previously Presented) The liquid-filled lens driver according to claim 26, wherein the determination of the power status of the liquid-filled lens driver is performed in such a way as to normally operate the liquid-filled lens driver by enabling all reference voltage and bias voltage of the liquid-filled lens driver and turning on the system clock generation unit when a normal power mode signal is received.

29. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the exchanging of the lens driver control signal and the status information of the liquid-filled lens by the input/output interface unit is performed by a 3-wire serial communication method using: a clock signal wire for exchanging a control clock signal that controls the exchanging of image information; a data signal wire for exchanging data related to the image information; and a power control signal wire for determining power status of the liquid-filled lens driver.

30. (Previously Presented) The liquid-filled lens driver according to claim 29, wherein the determination of the power status of the liquid-filled lens driver is performed in such a way as to stop operation of the liquid-filled lens driver by disabling all reference voltage and bias voltage of the liquid-filled lens driver and turning off the system clock generation unit when a power-off mode signal is received.

31. (Previously Presented) The liquid-filled lens driver according to claim 29, wherein the determination of the power status of the liquid-filled lens driver is performed in such a way as to normally operate the liquid-filled lens driver by enabling all reference voltage and bias

voltage of the liquid-filled lens driver and turning on the system clock generation unit when a normal power mode signal is received.

32. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the exchanging of the lens driver control signal and the status information of the liquid-filled lens by the input/output interface unit is performed in such a way as to receive an effective data signal through a data signal wire by synchronizing with a clock signal transmitted through a clock signal wire.

33. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the exchanging of the lens driver control signal and the status information of the liquid-filled lens by the input/output interface unit is performed in such a way as to set a register value in the input/output interface and read/write information from/in the register.

34. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the exchanging of the lens driver control signal and the status information of the liquid-filled lens by the input/output interface unit is performed while controlling each liquid-filled lens driver using a unique ID of the liquid-filled lens driver.

35. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the high voltage generation unit comprises:

a converter module for Direct Current (DC) converting voltage of a battery of the mobile information terminal into high voltage for driving the liquid-filled lens;

a voltage conversion clock generation module for generating a voltage conversion clock that is used for the DC voltage conversion by the converter module; and

a voltage conversion arresting module for stopping voltage conversion by stopping operation of the converter module when the voltage conversion is performed such that the high voltage generated by the converter module exceeds voltage for driving the liquid-filled lens (reference voltage).

36. (Previously Presented) The liquid-filled lens driver according to claim 35, wherein the high voltage generation unit further comprises:

a voltage division module for generating divided voltage lower than the high voltage by dividing the high voltage, which has been obtained through the conversion by the converter module, at a certain ratio; and

a voltage comparison module for comparing curvature reference voltage required for operation of the liquid-filled lens with the divided voltage generated by the voltage division module, and providing an arresting signal to the voltage conversion arresting module when the divided voltage exceeds the curvature reference voltage.

37. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the reference/bias voltage generation unit comprises:

a reference/bias voltage provision module for providing reference and bias voltage to electronic elements of the liquid-filled lens driver; and

a reference voltage generation module for generating analog voltage corresponding to a curvature value (drive voltage) of the liquid-filled lens transmitted from the image signal processor.

38. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the drive signal generation unit comprises:

a drive signal clock generation module for generating a drive clock in a waveform period of a signal for driving the liquid-filled lens;

a low voltage differential signal generation module for generating two low voltage differential signals having a voltage level of a battery of the mobile information terminal based on the drive clock; and

a high voltage differential signal generation module for generating plus and minus differential drive signals, that is, the final drive signal for the liquid-filled lens, by increasing a voltage amplitude of the low voltage differential signal to a level of the high voltage generated by the high voltage generation unit.

39. (Previously Presented) The liquid-filled lens driver according to claim 24, wherein the input/output interface unit, the system clock generation unit, the high voltage generation unit, the reference/bias voltage generation unit, the drive signal generation unit, and the control unit are integrated in a single chip.

40. (Previously Presented) A high voltage generation circuit for generating high voltage to drive a liquid-filled lens, comprising:

a converter module for DC-converting voltage of a battery of the mobile information terminal into high voltage for driving the liquid-filled lens;

a voltage conversion clock generation module for generating a voltage conversion clock that is used for the DC voltage conversion by the converter module;

a voltage conversion arresting module for stopping voltage conversion by stopping operation of the converter module when the voltage conversion is performed such that the high voltage generated by the converter module exceeds voltage for driving the liquid-filled lens (reference voltage);

a voltage division module for generating divided voltage lower than the high voltage by dividing the high voltage, which has been obtained through the conversion by the converter module, at a certain ratio; and

a voltage comparison module for comparing curvature reference voltage required for operation of the liquid-filled lens with the divided voltage generated by the voltage division module, and providing an arresting signal to the voltage conversion arresting module when the divided voltage exceeds the curvature reference voltage;

wherein the voltage conversion clock generation module generates a plurality of clocks having various frequencies so that the converter module can selectively use a voltage conversion clock; and

wherein the converter module variably selects and uses the plurality of clocks, which are generated from the voltage conversion clocks, according to characteristics of electric elements (inductor, capacitor, diode) of the converter module.

41. (Previously Presented) The high voltage generation circuit according to claim 40, wherein the converter module comprises:

a discontinuous current mode DC-to-DC converter stage for causing current flowing through an inductor to be discontinuous;

an overcurrent detection stage for detecting overcurrent and generating an overcurrent detection signal when the overcurrent flows through the inductor and a first transistor for performing voltage amplification conversion; and

an AND gate for generating a first transistor drive clock, that is, a bias voltage signal to the first transistor, by performing logical AND operation on the overcurrent detection signal received from the overcurrent detection stage and the voltage conversion clock generated by the voltage conversion clock generation module.

42. (Previously Presented) The high voltage generation circuit according to claim 41, wherein the overcurrent detection stage comprises:

a second transistor having a capacity corresponding to 1/N (N is an integer) of that of the first transistor;

a constant current source for calculating allowable maximum current capable of flowing through the inductor and the first transistor of the DC-to-DC converter stage, and applying constant current corresponding to a value (that is, allowable maximum current/N) obtained by dividing the allowable maximum current by N; and

an overcurrent detection voltage comparator for comparing amplification voltage V1, which is generated when the first transistor of the DC-to-DC converter operates, with amplification voltage V2 of the second transistor, which is generated when the constant current generated by the constant current source flows, and generating an overcurrent detection signal when the V1 is higher than V2.

43. (Previously Presented) The high voltage generation circuit according to claim 42, wherein the constant current source receives the overcurrent detection signal for variably controlling an amount of current from the control unit, and applies constant current corresponding to the consumed current and drive current of the liquid-filled lens.

44. (Previously Presented) The high voltage generation circuit according to claim 42, wherein the excessive current detection voltage comparator receives a control signal, and performs comparison only when the first and second transistors operate.

45. (Currently Amended) A drive signal generation circuit for generating a final drive signal ~~an output waveform~~ to drive a liquid-filled lens, comprising:

a drive signal clock generation module for generating a drive clock in a waveform period of a signal for driving the liquid-filled lens;

a low voltage differential signal generation module for generating two low voltage differential signals having a voltage level of a battery of the mobile information terminal based on the drive clock; and

a high voltage differential signal generation module for generating plus and minus differential drive signals, that is, the final drive signal for the liquid-filled lens, by amplifying ~~increasing~~ a voltage amplitude of the low voltage differential signal to a level of the high voltage generated by [[the]] a high voltage generation unit.

46. (Previously Presented) The drive signal generation circuit according to claim 45, wherein the drive signal clock generation module generates a plurality of clocks having various frequencies so that the low voltage differential signal generation module can selectively use an optimal differential signal period for driving the liquid-filled lens.

47. (Previously Presented) The drive signal generation circuit according to claim 45, wherein the liquid-filled lens is operated in a differential signal manner by connecting a first of plus and minus drive signals to a first terminal of the liquid-filled lens and a second of the plus and minus drive signals to a second terminal of the liquid-filled lens.

48. (Previously Presented) The drive signal generation circuit according to claim 45, wherein the high voltage differential signal generation module comprises:

a voltage level converter for generating plus and minus drive signals, that is, final drive signals, by voltage level-converting voltage of the low voltage drive signal generated in the low voltage differential signal generation module into high voltage input from a converter module;

first and second buffers for buffering the plus and minus drive signals, which are generated by the voltage level converter, with respect to the liquid-filled lens; and

a slope adjusting resistor for keeping slopes of rising and falling edges of the plus and minus drive signals uniform regardless of signal amplitude.